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UNITED STATES GOVERNMENT

Memorandum

TO : Files

DATE: May 26, 1967

FROM : Arnold B. Joseph, Marine Scientist
Environmental Sciences Branch, DBM

SUBJECT: PRELIMINARY TRIP REPORT--"BIKINI ATOLL ENVIRONMENTAL SURVEY-1967"

BMES:ABJ

An Atomic Energy Commission-Trust Territories environmental survey team of ten scientists and technicians and four Marshallese natives made radio-activity measurements, took samples of soils, vegetation and animals, and observed environmental conditions at essentially all of the islands in the Bikini Atoll during the period April 23 to May 7, 1967.

The team consisted of thirteen AEC and AEC contractor personnel and one Trust Territory representative: Tommy McCraw, Radiological Physicist (Division of Operational Safety) and A. B. Joseph, Marine Scientist (Division of Biology and Medicine), AEC Headquarters; Harold Beck and Burt Bennett (Radiological Physics) of the AEC's, New York, Health and Safety Laboratory; Francis Tomnovec and Edmond Jones (Radiological Physics) of the U. S. Naval Radiological Defense Laboratory; Edward Held (project leader), Robert Erickson and Jack Tobin (Ecologist, Fisheries Biologist and Anthropologist), University of Washington; Trust Territories personnel: James Hiyan, Majuro District Agriculturalist (Trust Territories); and four Marshallese natives (paid by AEC)--one of whom (Jendrik L.) was a former Bikini resident.

Transportation to Bikini and around the Atoll was by the M/V Militobi, a Trust Territory chartered passenger-cargo ship, rechartered by AEC. This ship (156 feet long, 11 feet draft, 486 gross tons) was manned by a crew of 21 of mixed nationalities--mainly Micronesian. The ship's cargo hauling workboats provided ship to shore transportation; these were advantageous in the rough waters at the south edge of the Atoll.

The survey team made measurements and observations on 17 separate land masses; a small island - Arriikan - on the southern rim was bypassed, as were four sand bars (unnamed) on the north rim.

Hundreds of radiation measurements were made, mostly with handheld, beta-gamma, Geiger-Muller type survey meters. Gamma spectra were measured at several places on the larger islands and on soil samples from islands where

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the water was too rough to land the equipment. Some low-level measurements were made with the HASL large volume ion-chamber and also the handheld Na-I crystal scintillation-type detector. Thermo-luminescent-detectors (TLD), a new type of radiation dose device, were placed at likely habitation areas on Bikini and Enyu Islands for approximately two weeks. Film badges were worn by all survey party members during the Bikini Atoll surveys. The TLD's and film badges were flown back to the U.S. for readouts. The only radiation values which are available at present are those made with the handheld survey instruments and these should be considered only tentative in that the instruments have not been, as yet, calibrated for the spectrum of isotopes present or their dose rates. Many of the measurements were at the lower limit of sensitivity of the instruments where some uncertainty exists.

The three largest islands, where most of the natives formerly resided, are Bikini, Enyu and Namu. Bikini is the largest by a factor of 2 to 3 area-wise. Some families also resided on two or three of the smaller islands on both the northern and southern rims (according to Jendrik L.).

The lowest radiation levels were detected on Enyu, the second largest island. Values everywhere in the Island were in the range of 0.01 to 0.02 mr/hr, or less, both gamma and beta-gamma at the surface and at 3 feet. On Bikini there appeared a radiation gradient ranging from approximately 0.04 mr/hr gamma and beta-gamma near the lagoon side beach to a level of approximately 0.25 mr/hr near the center of the island and to 0.02 mr/hr at the ocean beach side. On Namu there was also a radiation gradient ranging from 0.02 mr/hr at the lagoon beach to 0.35 mr/hr at an interior location to 0.06 mr/hr on the ocean beach side. Other islands on the southern edge of the Atoll - Eniirikku and Rukoji - which were downwind of nuclear tests, had levels of about 0.3 mr/hr. The Aomoen-Yurochi chain of Islands on the north side had one area where the radiation level was 0.5 mr/hr. On islands further away from shot sites and not directly downwind levels were more in the range of 0.02 to 0.06 mr/hr.

On most of the smaller islands, within five miles of test points, fragments of metal--ferrous and aluminum alloys--had readings up to 5 mr/hr. Steel reinforcing rods still imbedded in concrete structures facing test points likewise indicated some activity--up to 0.5 mr/hr.

The gamma spectrometer readings on Bikini and Namu indicated that the gamma activity was largely from isotopes of cobalt and cesium; cesium-137 being the major contributor to the total counts. The low activity level on Enyu gave no clear picture of contributing isotopes. Gamma spectrometer readings on soil samples from the smaller southern islands indicate a complex mixture of activation and fission products such as Cs-137, Co-60, Sb-125, Rh-102 and Eu.

Plant and animal life now exist on all the islands and marine life appears to be abundant in the lagoon and ocean reef waters. The lagoon waters were murky with suspended silt in 1964 and the coral growth was severely inhibited. Such was not the case in 1967--the waters were clear and the coral obviously growing again. Bikini and Enyu are more thickly overgrown than in 1964. However, the plant species are mostly of the wild and weedy type, such as scaevola, messerschmidea and dodonea. There were some coconuts and pandanas. There were also some coconuts at the former test camp site on Airukijji. Coconut crabs were captured on Bikini and Enyu and on two of the smaller southern rim islands. The southern rim islands also appeared to be breeding grounds for sea birds such as boobies, frigate birds, noddies, and terns. The survey party and ship's crew captured about a dozen green sea turtles--two of which were in the 300 pound class. A giant clam was taken from the lagoon at Bikini Island; none were found in 1964.

The survey was successful in that all work items were done that were planned. There remains much work to be done before a recommendation can be made regarding repatriation. Samples of soils, plants and animals need to be analyzed for isotopes; the instruments need to be calibrated for the isotope mixtures and levels and then intercalibrated with each other so as to get data as precise as possible; then the radiation data will have to be analyzed in the light of changing human living habits and permissible population dose limits (some levels are higher than guides for the population used by Federal Agencies in their health protection activities). It may be that certain areas may have to have time-limited access and that certain local foods may have to be banned (coconut crabs). Some problems of agriculture have straightforward solutions while others will require careful consideration. The islands obviously will sustain plants and a tentative planting plan has been suggested by the Trust Territories agriculturalist. However, if the isotope data indicate clean-up operations, how to accomplish it without losing the limited organic matter is still a puzzle. In any event, it takes five to seven years from time of planting to get a harvest from a coconut plantation. It may be desirable to initiate at an early date an agricultural research program leading to improved species and agricultural techniques.

WASH 4/17/67

BIKINI SURVEY - 1967

Arriving - Sun 4/16
HAG mon 4/17
meeting Tues 4/18
Kwaj Thurs 4/20

SURVEY TEAM MEMBERS

University of Washington:

Edward E. Held
Robert C. Erickson
Jack A. Tobin (Anthropologist)

WASH DC

USAEC-Division of Biology & Medicine

Arnold B. Joseph

(WASH DC)
USAEC-Division of Operational Safety

Tommy F. McCraw

U. S. Naval Radiological Defense Lab.

Francis M. Tomnovec
Edmond W. Jones

(NYO)
USAEC-Health & Safety Lab.

Harold Beck
Burton Bennett

Trust Territory Agriculturist

Neil Morriss

COORDINATORS

Dr. Edward E. Held - Chief of Party - University of Washington

William A. Bonnet - Area Manager - AEC Honolulu Area Office
Neil S. Rasmussen - Honolulu

Don McAfee - KTS Manager - Global Associates
Frank Granich - Kwajalein

Dwight Heine - District Administrator - Trust Territory
Robert Johnson - Kwajalein

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BIKINI SURVEY (BIO-MED)
FOLDER 01 THRU 06/1968

